

# PATENT SPECIFICATION

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## Paper Dielectric Material.

### COMPLETE SPECIFICATION

We, REMIX RADIOTECHNIKAI V., a Hungarian Body Corporate of Pataki Istvan ter 20, Budapest X, Hungary, do hereby declare the invention, for which we pray that

5 a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention is concerned with improvements in or relating to paper dielectric material which is suitable for use in the manufacture of electrical condensers.

In paper- and metal-paper condensers one uses impregnating agents which serve to protect them against moisture and also to improve their effective capacitances. As impregnating agents there are chosen substances having a relatively high dielectric constant which increases the breakdown

10 potential of the condenser, and which do not unfavourably influence dielectric loss and leakages. Metal-paper is particularly of use in the production of miniature condensers.

The regeneration capacity of condensers

15 is considerably influenced by metal-paper.

Thus it has been shown that at the moment of breakdown the thin metal layer evaporates as a result of the heat liberated during the breakdown and since a breakdown channel is formed in the region where the metal

20 lining is destroyed, the broken-down part of the dielectric is insulated from the other parts. If, however, the evaporation velocity of the metal layer is greater than the trans-

25 plantation velocity of the breakdowns in the dielectric, the condenser is regenerated after a few such occurrences. In order to achieve these favourable conditions metal-paper condensers are impregnated with paraffin, cere-

30 sin or transformer oil. The dielectric constant of these materials however lies between 2 and 2.5 and this makes them unsuitable for use in miniature condensers. Known substances with higher dielectric constants, e.g.

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45 chlorinated naphthalene, are unsuitable as

impregnating agents for metal-paper condensers, since on the one hand because the transplantation velocity of the breakdowns is higher than the evaporation velocity of the metal lining the condenser is not regenerated and on the other hand the breakdown takes place explosively at a voltage lying just above the normal operating voltage.

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The chlorinated aromatic hydrocarbons used in paper condensers, in particular chlorinated naphthalene, are electro-chemically unstable, so that even paper condensers impregnated with these substances perish relatively quickly.

55 It has now been found that castor oil containing an antioxidant can with advantage be used as impregnating agent for paper dielectric material especially for metal-paper dielectric material.

60 According to the invention therefore there is provided paper dielectric material, especially metal-paper dielectric material, which is impregnated with castor oil containing an antioxidant.

65 The antioxidant can with advantage be an aromatic compound, in particular hydroquinone. The antioxidants are conveniently used in a quantity of 0.5 — 3% by weight of the castor oil. Castor oil stabilized in this manner shows a dielectric constant of 4—4.5 and a loss factor of 50—80 x 10<sup>-4</sup>. In comparative tests, metal-paper condensers impregnated with castor oil had their regenerative power and specific capacity increased

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75 by at least 50% as compared with condensers impregnated with paraffin or ceresin.

80 It was found in a test that castor oil containing 1.5% by weight thereof of hydroquinone enabled the specific capacity to be raised by 100—150% if gas bubbles were removed from the impregnated paper dielectric at reduced pressure during impregnation. This is of importance in the manufacture of miniature condensers. Vacuum

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(Price 3s. 6d.)

impregnation can be carried out in any convenient vacuum vessel. The extent of impregnation can be estimated by observing the formation of bubbles during the 5 vacuum impregnation. Impregnation is continued until no further bubbles are formed. A process of this nature can readily be carried out and lends itself to large-scale automatic production.

10 WHAT WE CLAIM IS:—

1. Paper dielectric material suitable for electric condensers which is impregnated with castor oil containing an antioxidant.

2. Paper dielectric material as claimed 15 in claim 1 in which the paper dielectric material is a metal-paper.

3. Paper dielectric material as claimed in claim 1 or claim 2 in which the antioxidant is an aromatic compound.

20 4. Paper dielectric material as claimed in claim 3 in which the aromatic compound is hydroquinone.

5. Paper dielectric material as claimed in any of the preceding claims in which the 25 antioxidant is used in an amount of 0.5—

3% by weight of the castor oil.

6. Paper dielectric material as claimed in any of the preceding claims in which the impregnation is carried out at reduced pressure until no further bubbles are formed. 30

7. Paper dielectric material as claimed in claim 1 substantially as herein described.

8. An electrical condenser containing paper dielectric material as claimed in any of the preceding claims. 35

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